

EXCAVATIONS AT THE "SUNDE SITE", N38/24, MOTUTAPU ISLAND, NEW ZEALAND

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Abstract. N38/24, a midden at Sandy Cove, Motutapu Island, was excavated in July 1963. Evidence of Polynesian occupation was found above and below the Rangitoto ash (A.D. 1188 \pm 50 years).

The scientific study of the prehistory of Motutapu was initiated in 1958 and 1959 when J. Golson directed excavations during two field seasons at Pig Bay. Reports describing the results of the Pig Bay excavations outline the general progress of the work (Golson and Brothers 1959, pp. 5-8), and offer certain preliminary conclusions (Brothers and Golson 1959, pp. 569-77). The excavation of the stratified deposits at Pig Bay revealed an intensive, if not continuous, occupation of the site during the interval A.D. 1208 \pm 50 to 1678 \pm 40, following the eruption of nearby Rangitoto. Evidence of man's activity during this time was found within a geological sequence of interbedded water-laid ash beds and dune sediments, all overlying an 18 inch (46 cm) thickness of Rangitoto ash. Typological dating of adzes from Pig Bay appeared to place at least part of the site within the Moa Hunter horizon of New Zealand prehistory (Brothers and Golson 1959, p. 576). Finally, the presence of a piece of worked greywacke from beneath the Rangitoto ash at Pig Bay "strengthened by similar discoveries reported by Mr. R. Sunde from a beach site on the north-west coast of the island" suggested human occupation on Motutapu prior to the eruption of Rangitoto.

So much was generally recognised but, because a complete analysis of the Pig Bay material was not possible at that time and, more important, because almost no local comparative data were known, only the most tentative conclusions were possible. Thereafter, the question of man's presence on Motutapu prior to the eruption of Rangitoto became increasingly important, particularly when viewed against the broader problem of man's place in general New Zealand culture history. Thus in July 1963, at the suggestion of R. C. Green, Senior Lecturer in Prehistory, University of Auckland, the author, with members of the Auckland University Archaeological Society, began archaeological work on Motutapu. The excavations at Pig Bay had forecast the need for further work on the island, and the report which follows documents the limited, but rewarding, archaeological study of the Sunde site.

THE SETTING

Within Northwestern Bay, on the north-west coast of Motutapu, lies Sandy Cove, a remnant terrace in one of several drowned valleys within the Bay. The general topography of the area will be best understood by an examination of Fig. 1, which gives an adequate idea of the situation of the Sunde site with reference to the

coastline and the immediately surrounding land. The site, N38/24, discovered $\frac{3}{4}$ mile (1.2 km) south-west of Pig Bay, lies on the almost level plain of Sandy Cove which is bounded on the north and south by the higher tableland of Motutapu whose further flanks drop precipitously into the ocean. To the east, the land slopes gently upward toward the narrow head of the small valley, and its western boundary is the rapidly eroding beach front where an unknown portion of the archaeological site has already disappeared.

In modern times, the population of Motutapu has been low, the land having been used almost exclusively for farming and sheep raising. The valley bottom, which is cut by a permanent stream, has a good cover of grass with a prominent stand of pohutukawa, *Metrosideros excelsa* Gaertn., immediately to the north.

After the discovery of the site by R. Sunde in 1958, surface collections were made during several subsequent visits (Golson 1959, p. 7). At this time, N38/24 presented a disturbing picture of erosion by wind and wave action. The general area of the midden, which is only slightly higher than the surrounding land, is flat on top, covered effectively by grass, and gives no indication of the strata below. The midden, however, as a result of erosion slopes as a whole in the direction of the ocean, i.e., the direction normally taken by runoff flowing toward the beach. The beach and lower slopes of the midden receive the accumulation of shell and bone washed from above, as well as large blocks of primary ash also weathering out. The special feature of this part of the coastline which attracted Mr. Sunde's attention to the site, is the lenticular patches of human refuse which appear in the interface of ash and beach sand (Fig. 2). Random collections made along the eroding surface of this interface have generally yielded excellent results in the form of avian and mammalian bone as well as implements of stone and bone.

THE INVESTIGATIONS

On July 1, 1963, the writer in company with R. C. Green, visited the site for the purpose of planning the excavations, and field work began the following week. The entire month of July was consumed by this excavation, although field work was possible only during weekends. Members of the Auckland University Archaeological Society were employed as volunteer labourers, both in the field and in the laboratory processing of materials. Because the excavation of N38/24 was conceived as a vital, but necessarily limited operation, the scope of the work called for only six to nine workers during any single digging period.

The field work began in several ways at once. A contoured site map of the Sandy Cove drainage area was started, and several workers were sent to reconnoitre the beach on either side of the excavation area in order to note the location of cultural material beneath other exposures of Rangitoto ash. The position of artifacts and human waste beneath the ash was extremely interesting and a systematic study of this, the deepest cultural deposit known on Motutapu, was the most important objective at the Sunde site. The development of an efficient technique for this task was a matter of experimentation. The procedure first adopted was to cut longitudinally along the outer face of the ash and weaken the resultant narrow block so that it could be lifted out and overturned and examined for waste material usually found

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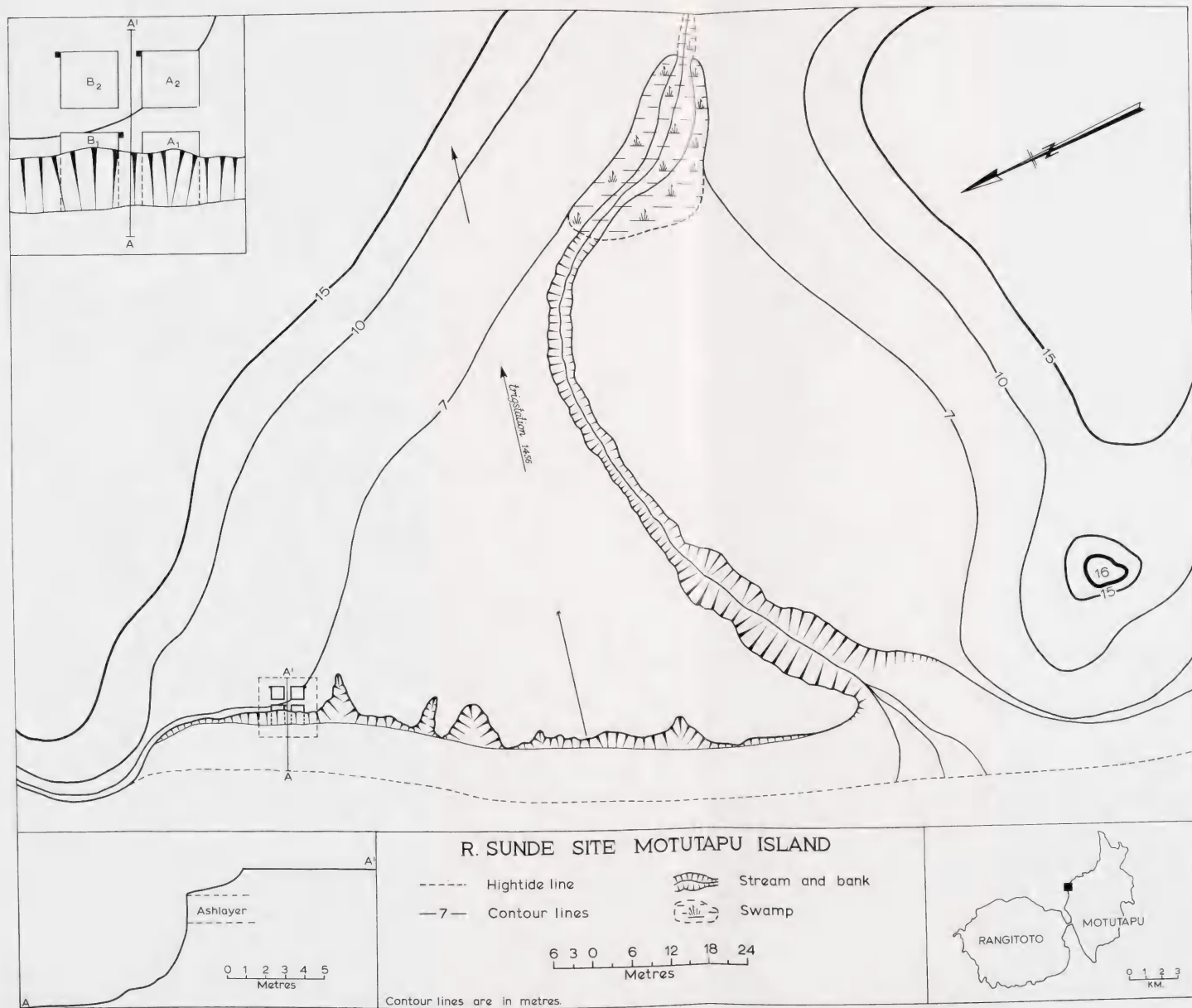


FIG. 1. Plan of "Sunde site", N38/24, Sandy Cove, Motutapu Island.

adhering to the bottom. Because of the thickness and well-compacted consistency of the ash, this method proved to be too laborious. Better success was achieved by excavating beneath the ash to form a tunnel approximately two metres wide, which opened on the seaward side and was continuous with a vertical shaft at its opposite end (Fig. 2). This made it possible not only to collect more rapidly the abundant evidence of man's occupation of the terrace before the eruption of Rangitoto, but to do so in such a way that the sequence of deposition, both cultural and natural, would be better preserved for study.

For the archaeology of the upper soil horizons, the procedure of excavation and notation was essentially unaltered from that used previously by Golson on Motutapu and employed generally for midden archaeology in New Zealand. The actual area for excavation at the Sunde site was selected to coincide with the greatest density of cultural material beneath the ash. Four two-metre squares were dug, leaving one-metre baulks between squares. Ultimately, several baulks were removed to allow a more complete study of the appearance, composition and dip of the succession of strata. In each of the four squares, the columns were removed in 6 inch (15 cm) arbitrary levels until the natural strata became apparent. The natural strata, which then served as excavation levels, were numbered down from the top, and were found to be the same in all four squares. No grid system was drawn, but the site of excavation was located from benchmark 1 which had itself a known relationship to Trig Station 1456. All vertical measurements were calculated from a datum whose elevation above sea level had been determined by level and stadia rod.

All finds were located by depth level and square number, however, inasmuch as the same natural stratigraphy was found in all four squares, and since the excavation was limited horizontally, no conclusive importance is attached to the horizontal provenance of any artifact. Exceptions noted were *haangi* and other special features such as possible postholes.

Certain compromises in field methodology were necessary owing to the limited time and nature of the excavation. There was a great density of shell and other refuse in the cultural strata and the excavated earth was examined only once for content, from trowel to shovel. All worked stone and worked bone, plus representative collections of shell and faunal material were saved from each level. In addition, three columns, each 15 cm square, were dug adjacent to the main excavation. In each column, the total volume of each level was collected so that the content of each level would be susceptible to direct observation in the laboratory.

At the conclusion of the digging each week, all excavated material was taken to the laboratory. Artifacts and faunal material were numbered according to the catalogue system of the Department of Anthropology, preparatory to identification and analysis. All material from the site was transferred to the permanent collections of the Auckland Institute and Museum in 1968.

GEOLOGY

Three distinct lithologies are present in the section of the Sunde site and each will be discussed.

(1) The lowest formation contains sands and numerous bleached fragments of shell: it underlies a distinctive terrace surface, marked by a soil horizon, which stands at 2 m above high water mark. The sands are rich in quartz, feldspar and lithic detritus from the adjacent Tertiary and Mesozoic rocks and they significantly lack basaltic debris typical of the Rangitoto ash. On the landward side of the terrace, and underlying its surface, a small pocket of lacustrine beds consists of fine clays and vegetal remains and represents the margin of a swamp which occupied a shallow depression of the original terrace surface.

(2) Rangitoto ash, averaging 70 cm in thickness, covers the surface of the buried terrace. In mineralogical and textural detail it is identical with that described $\frac{3}{4}$ mile (1.2 km) to the north-east at Pig Bay by Brothers and Golson (1959, p. 571). Brown shards of basaltic glass are abundant and form the matrix for chips of vesicular basalt and crystal fragments of olivine, pyroxene, plagioclase feldspar, and opaque ores. The ash is massive and the interface against the old terrace surface is clearly defined.

(3) The ash grades upwards into a set of beds, 1.25 m thick, which are varied in character, but which consist mineralogically of ash mixed in varying proportions with normal beach sands. Dune bedding, sometimes topped by a fossil immature soil, indicates periods of wind deposition; horizontally-bedded mixed sands are lake beds formed in dune hollows, or surface wash from the adjoining hill slopes. This uppermost group of beds contains a variety of artifacts.

The overall stratigraphy at the Sunde site is in complete accordance with the sequence at Pig Bay; that is, a set of ash-free sands, covered by Rangitoto ash, which passes upwards into dune and lake sediments with ample evidence of human occupation.

At the Pig Bay locality, N38/21, the ash rests, at modern high-water mark, on a beach sand containing abundant shell fragments. This sand was interpreted as the beach deposit forming the strand line immediately prior to eruption of the Rangitoto ash, for the following reasons:

- (1) the sand does not rise above present sea level,
- (2) fragments of basalt or basaltic glass are absent from the sand, and
- (3) the constituent shell fragments gave a carbon date of A.D. 1208 ± 50 years. Confirmatory evidence was obtained from carbon dating charred twigs, found immediately below the ash, but on top of greywacke soil at the east end of Pig Bay. The date determined was A.D. 1188 ± 50 years (Brothers and Golson 1959, p. 573).

In the Pig Bay area, and elsewhere on Motutapu, there appears to be only one primary Rangitoto ash layer, which is succeeded upwards by wind-blown and water-laid beds containing artifacts and consisting of reworked ash with admixed normal sediments. At Pig Bay, this single ash fall carpeted the landscape and was spread as an 18 inch (46 cm) layer over sands at the head of the beach, and over the neighbouring hills.

At the Sunde site, the same ash layer is two feet (61 cm) in depth, the greater thickness no doubt being a result of closer proximity to the Rangitoto source vent.

Again at this locality, the primary ash bed is overlain by a mixture of reworked ash and other sedimentary detritus enclosing adze flakes, charcoal and fish bones.

There is one feature of particular interest in the stratigraphic section from the Sunde site. The ash has covered and concealed a natural terrace which has its surface at 2 m above modern high tide mark; the shelly sands underlying the terrace are exposed by erosion on the seaward side and were penetrated during excavation of the site. Brothers (1954, pp. 686, 688) commented that recent retreat of the sea from a post-glacial maximum was responsible for beaches and benches 8 to 12 feet (2.4 - 3.7 m) above modern sea level and commonly filling bay-heads, e.g., at Kaipara and Auckland. Schofield (1960, p. 478) studied beach ridges of a chenier plain in the Firth of Thames and obtained radiocarbon dates for samples of shell. The oldest sample was dated 3900 ± 90 years before present, and was from a beach ridge which indicated a former sea level 7 feet (2.1 m) above modern sea level. Schofield concluded (1964, p. 369) that sea level rose above the present about 4,000 years ago.

It follows that the interface between the Rangitoto ash (A.D. 1188 ± 50 years) and the terrace surface which may be 4,000 years old, is a time gap of possibly 3,200 years. The presence of human artifacts on the terrace surface, and below the ash, shows that about A.D. 1188 ± 50 years the terrace was inhabited. From an archaeological viewpoint, the succession at the Sunde site appears to have the following implications:

- (1) the adze flakes, adzes, fish bones, etc., that have been excavated from the terrace surface may represent many hundreds of years of human occupation before A.D. 1188 ± 50 years.
- (2) artifacts have not, and should not, be found in the sediments forming the terrace since these were deposited possibly 4,000 years ago, and
- (3) in view of the extensive time gap at the terrace/ash interface, and the lack of any intermediate deposits between the terrace surface and the ash, attention should be given to any carbon samples that can be obtained from *haangi* cut into the terrace surface; since the Rangitoto ash covers the terrace, such samples could be older than A.D. 1188 ± 50 years and could indicate a minimum length of human occupation in the area.

STRATIGRAPHY

The principal features of the stratigraphy at site N38/24 are shown in Fig. 2. Essentially, there are two cultural zones separated by Rangitoto ash. The section, including soil stratification and cultural content, consists of 12 numbered divisions and may be described as follows:

- (1) Level 1, found at the top of the section, is a well-defined zone of black humus of the same composition as level 3, although of slightly darker colour. It contains stone, bone, and shell scattered throughout.
- (2) Level 2 is a wind-deposited, non-humic dune sediment of ash and beach sand containing obsidian, shell, bone, and stone, etc.

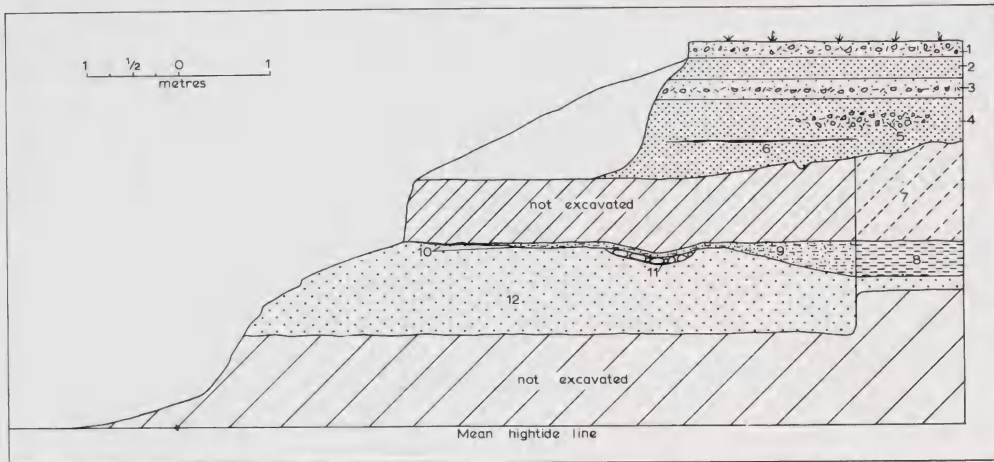


FIG. 2. Cross-section drawing of main excavation, site N38/24, Sandy Cove, Motutapu Island.

- (3) Level 3, a rich black humic soil horizon as in level 1, has abundant evidence of human occupancy, in bone, stone, charcoal, etc.
- (4) Level 4, as in level 2, is non-humic beach sand and ash, and both are lighter in colour than levels 1 and 3. This, the thickest stratum, was found to be relatively free of shell and stone, etc., throughout the early part of its deposition.
- (5) and (6) These do not represent time divisions, but features of man's occupancy during the period of wind deposition marked by level 4. As may be readily seen by reference to Fig. 2, these two features represent: a dense pocket of tightly packed shell and other waste food material (5), and an elongated, thin seam of the same material (6). Both may have been small, local refuse heaps since neither was found to be continuous in the opposite wall of the excavation. A *haangi* was found in close association with (5).
- (7) Rangitoto ash. See GEOLOGY for description.
- (8) This is a stiff, reddish clay loam containing scattered pebbles, small fragments of bone, and excrement. These clays undoubtedly contain much decomposed organic material, and several well preserved positive leaf impressions from the top of the clay were found on the bottom of the overlying ash (see Cooper, Appendix 1).
- (9) A sandy clay loam, representing a continuation of (8), but with an admixture of sand. This deposit grades out into a thin lens of sandy clay and does not appear in the beach profile. No cultural material.
- (10) Terrace/ash interface, as described earlier. This can best be thought of as a thin seam of varied faunal remains, plus several implements of bone and stone, deposited on top of unstratified beach sand and buried directly by ash from Rangitoto, i.e., without the interposition of other occupation, either natural or cultural.

- (11) This was an approximately circular fireplace, around which sandy clay had been discoloured by burning. A large quantity of charcoal was recovered. Figure 2 illustrates the way in which the falling ash mantled the surface of the terrace and filled the depression created by this *haangi*.
- (12) Terrace. See GEOLOGY for description.

At the Sunde site, therefore, five major periods of occupation may be recognised: the period of occupation of the terrace up to the level at which Rangitoto ash fell, followed by the ash itself, and finally, a series of four interbedded, culture-bearing soil horizons alternating between brown dune sands and black fossil soil.

FAUNAL REMAINS

Bone recovered from the site was identified by Mr. R. J. Scarlett of the Canterbury Museum, Christchurch. The species present in each layer, with an indication of the number of individuals, and the number of bones they were represented by, are given in Tables 1 and 2. A wide range of fauna was present in the layers beneath the Rangitoto ash, indicating that the early Polynesian visitors to the island exploited abundant bird life available in the vicinity. Both land and sea birds are well represented, and include the extinct crow and the extinct eagle as well as one moa bone. It is uncertain that moa was actually available on Motutapu, and this bone, and perhaps some other bird bones, may have been brought to the site. In addition to the many bird species, tuatara, fur seal, dog and fish were present in the layers beneath the ash.

Bone identifications from the four layers above the ash are given in Table 2. A very much smaller range of fauna was represented here. No birds at all were found in levels 1 and 2, in which the only bone was dog and fish, the latter in considerable quantity. Fish bone was also abundant in levels 3 and 4, with dog also present. In level 3, two sea birds were present, while several land birds, two sea birds, and fragments of a sea mammal were found in level 4.

The bone remains indicate a steady decrease in the range of species in the site through time, with the two upper levels resembling sites N38/37 and N38/30 (Allo, this volume) in the complete absence of bird and the predominance of fish, with a minor representation of dog. Although small amounts of bird bone are present in levels 3 and 4, these deposits are in marked contrast with the levels beneath the ash, which provide by far the fullest range of species yet known from an archaeological deposit in the Auckland area. The dramatic decrease in bird remains above the Rangitoto ash may be presumed to result both from the effect of the eruption on the surrounding area, and from the presence of man in the vicinity in increasing numbers.

There were 23 species of salt water shellfish found in the site. Their occurrence at each level is illustrated in Table 3, and is meant only as a ready guide to the presence or absence of individual species. The range of shells from beneath the ash is very restricted; a greater variety was present in all the upper levels, where a heavier reliance on sea foods generally, both fish and shellfish, apparently compensated for the much smaller range of birds.

TABLE 1
FAUNAL REMAINS, N38/24

BENEATH ASH

MOA

The smallest New Zealand Moa, *Euryapteryx curtus* (Owen), is represented by a nearly complete left tarso-metatarsus.

OTHER BIRDS

- Gannet, *Sula bassana serrator* Gray. Two individuals identified from 16 bones.
 North Island Kaka, *Nestor meridionalis septentrionalis* Lorenz. A minimum of 14 individuals identified from 96 bones.
 Spotted Shag, *Phalacrocorax (Stictocarbo) punctatus punctatus* (Sparrman). Four individuals identified from 26 bones.
 Extinct Crow, *Palaeocorax moriorum* Forbes. One bone.
 North Island Weka, *Gallirallus australis greyi* (Buller). Three individuals identified from 15 bones.
 Tui, *Prosthemadera novaeseelandiae novaeseelandiae* (Gmelin). Two individuals, one large and one small, were identified from 6 bones.
 Extinct New Zealand Eagle, *Harpagornis moorei* von Haast. One bone.
 Black-backed Gull, *Larus dominicanus* Lichtenstein. Two individuals identified from 4 bones.
 Parakeet, *Cyanoramphus novaeseelandiae novaeseelandiae* (Sparrman). One bone.
 Fluttering Shearwater, *Puffinus gavia* (Forster). This is almost certainly the nominate species as *P. gavia huttoni* hardly ever reaches Auckland. Two individuals identified from 7 bones.
 Northern Blue Penguin, *Eudyptula minor novaehollandiae* (Stephens). Two individuals identified from 11 bones.
 New Zealand Pigeon, *Hemiphaga novaeseelandiae novaeseelandiae* (Gmelin). Two bones.
 Buller's Shearwater, *Puffinus bulleri* Salvin. One bone.
 New Zealand Quail, *Coturnix novaeseelandiae novaeseelandiae* Quoy and Gaimard. Tentatively identified from one bone.
 Oystercatcher, *Haematopus* sp. Two bones.
 Shag, *Phalacrocorax* sp. One individual identified from 5 bones. Probably either a Pied or Black Shag.
 Grey Duck, *Anas superciliosa superciliosa* Gmelin. One bone.
 Duck, *Anas* sp. One bone.
 Charadriiformes. Not Black-backed Gull, Skua, Caspian Tern, Godwit or Oystercatcher. No comparable skeletal material available for positive identification. Three bones representing one individual.
 Kiwi, almost certainly Little Spotted (or Grey), *Apteryx oweni* Gould. One bone.
 Large Rail? Possibly *Gallirallus*. Four bones.

REPTILES

Tuatara, *Sphenodon punctatus* (Gray). Three individuals identified from 6 bones.

MAMMALS

- Fur Seal, *Arctocephalus forsteri* (Lesson). Several individuals, adult and immature, were identified from approximately 40 bones, many of which were very fragmentary.
 Polynesian Dog, *Canis familiaris* Linne, Polynesian subsp. A minimum of four individuals were identified from 20 bones.

FISH

Snapper, *Chrysophrys auratus* Forster.

CLAY LAYER BENEATH ASH

BIRDS

- North Island Kaka, *Nestor meridionalis septentrionalis* Lorenz. Two individuals identified from 10 bones.
 Spotted Shag, *Phalacrocorax (Stictocarbo) punctatus punctatus* (Sparrman). Two bones.
 Northern Blue Penguin, *Eudyptula minor novaehollandiae* (Stephens). Three bones.
 Extinct Crow, *Palaeocorax moriorum* Forbes. One bone.
 Gannet, *Sula bassana serrator* Gray. One bone.

FISH

Snapper, *Chrysophrys auratus* Forster.

TABLE 2
FAUNAL REMAINS, N38/24

ABOVE ASH

LEVEL 1

Polynesian Dog, *Canis familiaris* Linne, Polynesian subsp. One bone.
Snapper, *Chrysophrys auratus* Forster. Many bones.

LEVEL 2

Polynesian Dog, *Canis familiaris* Linne, Polynesian subsp. Six bones.
Snapper, *Chrysophrys auratus* Forster. Many bones.

LEVEL 3

Polynesian Dog, *Canis familiaris* Linne, Polynesian subsp. A minimum of four individuals identified from 17 bones.
Northern Blue Penguin, *Eudyptula minor novaehollandiae* (Stephens). Four bones.
Fluttering Shearwater, *Puffinus gavia* (Forster). Again, clearly not *P. gavia huttoni*. Two, possibly three bones.
Snapper, *Chrysophrys auratus* Forster. Many bones.

LEVEL 4

Polynesian Dog, *Canis familiaris* Linne, Polynesian subsp. A minimum of 6 individuals identified from 49 bones.
Northern Blue Penguin, *Eudyptula minor novaehollandiae* (Stephens). A minimum of 3 individuals identified from 4 bones.
Tui, *Prothemadera novaeseelandiae novaeseelandiae* (Gmelin). Three bones.
Spotted Shag, *Phalacrocorax (Stictocarbo) punctatus punctatus* (Sparman). One bone.
North Island Kaka, *Nestor meridionalis septentrionalis* Lorenz. Eight bones.
New Zealand Quail, *Coturnix novaezealandiae novaezealandiae* Quoy and Gaimard. Three bones.
Whale, ? Two possible fragments.
Snapper, *Chrysophrys auratus* Forster. Many bones.

TABLE 3
DISTRIBUTION OF SHELL BY LEVEL, N38/24

SHELL	LEVEL				Below ash
	1	2	3	4	
<i>Amphidesma australe</i> , pipi.	x	x	x		
<i>Amphidesma subtriangulatum</i>		x	x	x	
<i>Cellana radians</i>		x	x		
<i>Chione stutchburyi</i> , cockle.	x	x	x	x	x
<i>Cominella adpersa</i>	x		x		
<i>Cominella glandiformis</i>	x				
<i>Cominella maculosa</i>				x	
<i>Cookia sulcata</i> , Cook's Turban.	x	x	x	x	
<i>Crassostrea glomerata</i> , Rock Oyster.	x	x	x	x	x
<i>Evechinus</i> sp., Sea Urchin.		x	x	x	
<i>Glycymeris laticostata</i> , Dog Mussel.		x	x		
<i>Haliotis iris</i> , paua.	x	x	x		
<i>Haustrum haustorium</i>	x	x	x		
<i>Lunella smaragda</i> , Cat's Eye.	x	x	x		
<i>Maoricolpus roseus</i>	x		x	x	
<i>Maoricrypta costata</i>				x	
<i>Melagraphia aethiops</i>	x		x	x	
<i>Neothais scalaris</i>	x	x	x	x	
<i>Nerita melanotragus</i>			x	x	
<i>Pecten novaezealandiae</i> , Scallop.	x				
<i>Penion adustus</i>			x	x	
<i>Perna canaliculus</i> , Common Mussel.		x	x	x	x
<i>Scutus breviculus</i>			x		
<i>Siruthiolaria papulosa</i>			x		
<i>Xymene plebejus</i>			x		

TABLE 4
COMPOSITION OF STRATA ABOVE ASH, N38/24

LEVEL	COMPOSITION lb./%		
	Soil	Shell	Stone
1	29.035	4.100	0.200 lb.
	87%	12%	1%
2	24.005	0.380	2.080 lb.
	93%	0.5%	6.5%
3	20.015	7.050	3.025 lb.
	66%	25%	8.3%
4	51.460	1.300	3.465 lb.
	95%	2%	4%

The greatest number of shell species occurred in level 3, which also had the greatest concentration of shell in relation to other constituents (Table 4). Both rocky shore and soft shore species were well represented at all levels, with rocky shore species generally better represented in this site than in N38/30 and N38/37.

COMPOSITION OF LAYERS

An analysis by weight of the principal constituents of the layers above the ash was made. Table 4 gives the weight of each constituent and its percentage of the total weight of each layer of the column sample.

From this it can be seen that level 3 contained the most concentrated cultural remains, with the highest percentages of shell and stone. Level 1 had the next highest concentration of shell, but the smallest stone constituent of all layers, reflecting its lack of stone working and purely kitchen midden nature; levels 2 and 4 had relatively little shell, and a higher stone constituent, indicating stone working on the site.

The total area sampled was small. Although, on the basis of the column sample supported by observation of the excavated area, level 3 contained the most concentrated deposits of both artifactual and midden remains, it is not impossible that this situation varies and other levels contain more concentrated remains in other parts of the site.

ARTIFACTS

Analysis of artifactual material from this site was not completed before the author departed from New Zealand. A brief description of the artifacts is presented in Appendix 2.

CONCLUSIONS

The cultural evidence from this site indicates that it was occupied on three successive occasions by people with an Archaic material culture, evidenced by adzes mostly in the process of manufacture, and some items of fishing gear. The first of

these occupations was before the eruption of the Rangitoto ash and two (represented by levels 3 and 4) were after it. Some evidence indicates that the same tradition of adze manufacture was continued in a fourth occupation (level 2), although only a small amount of artifactual material was recovered from this level. The final occupation (level 1) indicates use of the site for cooking only. This may reflect a temporary occupation of a specialised kind, but may also mean that the use of the greywacke for adze manufacture had ceased. No dates are available for the site apart from the independent dating of the Rangitoto ash shower.

A major contribution of the excavation was the recovery of a considerable amount of bone, particularly from earlier levels. The bone from deposits beneath the ash is important as it is the only extensive faunal collection of this age from the Auckland area, and indicates the range of fauna available to early Polynesian settlers. Also significant is the marked decrease in faunal remains in post-ash-shower deposits, to the reliance in levels 1 and 2 on fish and Polynesian dog.

The excavation verified the occupation of Motutapu before the ash shower from Rangitoto. The results of the excavation of four squares, through four post-eruption occupation levels, supplement the results of Golson's earlier excavations at Pig Bay (N38/21), in indicating occupation characterised by Archaic artifacts; levels 1 and 2, however, suggest that Archaic material culture did not persist throughout the pre-historic sequence on Motutapu. The major significant advance of this excavation beyond the earlier Pig Bay excavation lies in the recovery of the artifactual and faunal material from beneath the ash, showing conclusively that the island was occupied before the ash shower by people who were able to exploit a wide range of birds and other fauna then available in the vicinity. This wide range of fauna, contrasting with the more restricted range from later levels, suggests that the initial occupation of the site belongs to the Settlement phase.

APPENDIX 1 — NOTES ON LEAVES FROM SITE N38/24

R. C. COOPER

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The leaves found immediately beneath the Rangitoto ash have been identified as follows:

- (1) Pohutukawa, *Metrosideros excelsa* Gaertn., Myrtaceae. A canopy tree, common in northern coastal forest.
- (2) Karaka, *Corynocarpus laevigatus* J. R. & G. Forst., Corynocarpaceae. A canopy tree, found in northern coastal and lowland forest.
- (3) Kawakawa, *Macropiper excelsum* Miq., Piperaceae. An aromatic shrub or small tree, common in coastal and lowland forest.
- (4) I am unable to decide whether this specimen (Fig. 3) is rewarewa, *Knightia excelsa* R.Br., Proteaceae; titoki, *Alectryon excelsus* Gaertn., Sapindaceae; or an "unknown". The matrix of Rangitoto ash is coated with fish scales. Specimens of the matrix were submitted to Dr. N. T. Moar, Botany Division, D.S.I.R., Christchurch, for pollen analysis, but pollen could not be obtained from them.

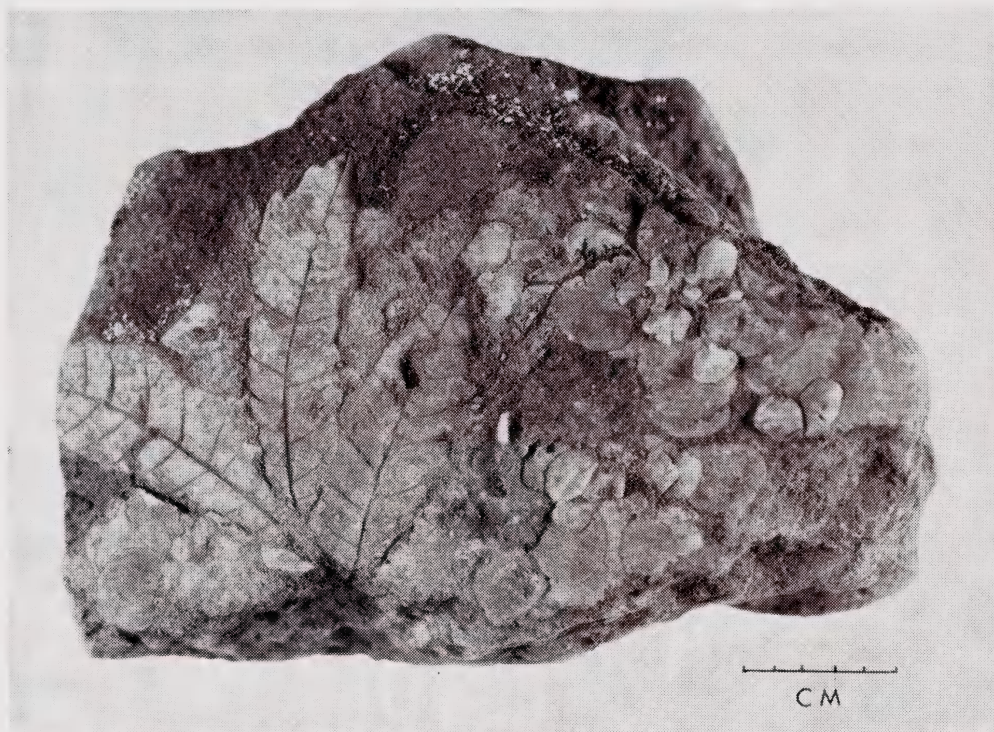


FIG. 3. A leaf and fish scales on the undersurface of ash from site N38/24, Sandy Cove, Motutapu Island.

APPENDIX 2 — NOTES ON ARTIFACTS FROM SITE N38/24

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The artifactual material recovered from the site was relatively sparse in comparison with the rich faunal remains. The excavated artifacts have been supplemented by limited surface collections from the vicinity of the site both before and after the excavation in 1963.

FISHING GEAR

A lure shank and portions of two one-piece bone hooks were found, as well as a small range of material indicating fishhook manufacture.

The point leg, bend, and part of the shank leg of a one-piece bone hook (AU 1561/298, Fig. 4c) was found beneath the Rangitoto ash. A portion of a similar hook was found *in situ* in the eroding section, beneath the ash, prior to the excavation. A partly worked bone tab (AU 1576/5, Fig. 4b), indicating fishhook manufacture, was found in level 4, square B-1. A small drilled-out central core (AU 1565/37) from fishhook manufacture was found in level 3, and a larger core (Fig. 4d) was collected from the eroding section and probably from beneath the ash.

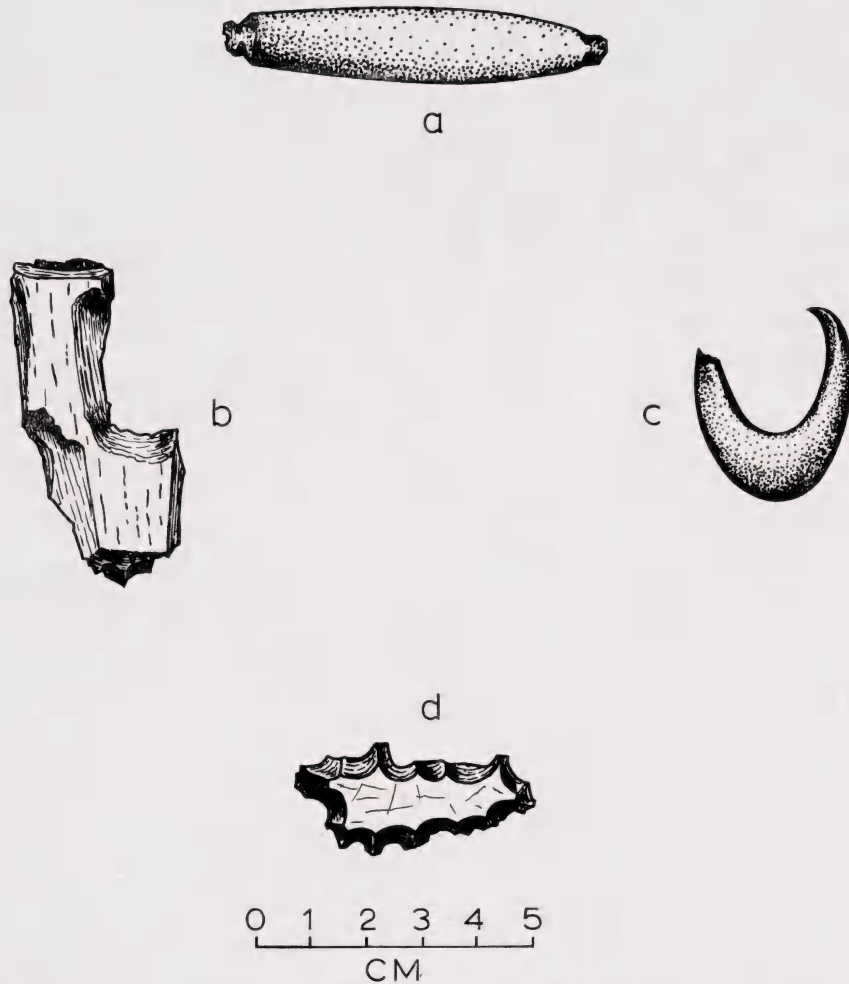


FIG. 4. Bone artifacts from site N38/24, Motutapu Island: a. lure shank, AU 1565/35. b. partly worked tab, AU 1576/5. c. one-piece hook, AU 1561/298. d. core.

A bone lure shank (AU 1565/35, Fig. 4a) and a small portion of a second lure shank were recovered from level 3, square A-1. As can be seen from the illustration, the complete lure is flat-oval in section, and grooved rather than perforated for line attachment. In size and shape it resembles a surface find from N38/21; the latter has a dorso-ventral perforation however. No lure points were found.

OTHER BONE ARTIFACTS

Two other pieces of worked bone were found. A dog canine, with an uncompleted drilled hole at the proximal tip, was found in level 1, square B-2. A piece of worked bone of doubtful purpose was recovered from level 3 in square A-1.

ADZES

The most frequent artifacts from the site were roughout adzes, which occurred in all levels except level 1. All appear to have been worked by flaking; a few show

signs of hammer dressing and one is partly ground. All appear to have been rejects, and the quality of flaking exhibited is not good. All appear to be made in local greywacke. Roughouts recovered from beneath the Rangitoto ash layer included both quadrangular and triangular sectioned specimens. The two largest examples both conformed to Duff's type 4 (1959, p. 137), and were remarkable in being noticeably thicker than they were wide. Two roughouts, one of which was in two pieces (Fig. 5a), had a diamond-shaped cross-section. The single fragment with rectangular cross-section was the smallest recovered from beneath the ash, and was relatively wide and thin. It was probably a roughout for an adze of Duff's type 2A.

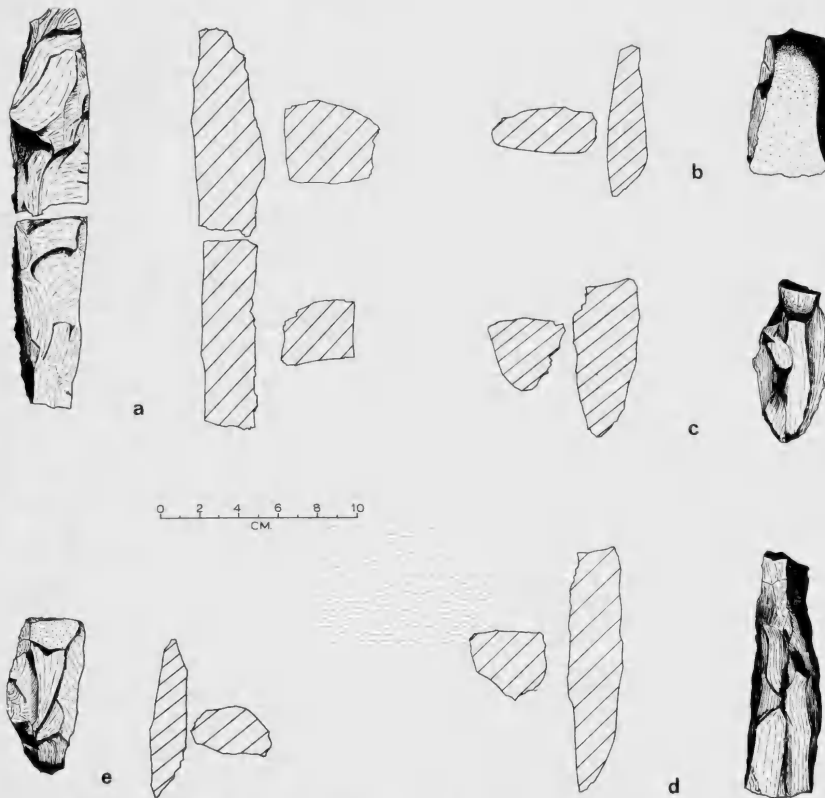


FIG. 5. Adze roughouts from site N38/24, Motutapu Island: a. broken roughout from beneath ash, AU 1561/388. b. roughout from level 4, AU 1568/1. c. fragment from level 4, AU 1576/1. d. roughout from level 3, AU 1565/8. e. roughout from site, AU 1604/3.

A single complete adze was recovered from level 4 (Fig. 5b). It is quadrangular in section, front narrower than back, and the front surface is formed by an unmodified pebble face. The sides, back, and bevel have been worked by flaking. Several fragments of roughouts were also recovered from level 4, including both rectangular and triangular sectioned specimens. AU 1576/1 (Fig. 5c) is a typical example, roughly flaked with some hammer dressing. Three specimens were catalogued as roughouts from this level, but several smaller fragments of roughouts, classified with the worked flakes, were also recovered.

The largest number of adzes came from level 3. There were 17 recognisable roughouts and several fragments which are probably parts of discarded roughouts. Both triangular and rectangular sectioned examples occur, and there are also several fragments with diamond-shaped cross-sections. AU 1565/8 (Fig. 5d) is one of the more complete examples from this level, and is hammer dressed as well as flaked. One small adze was partially ground, and is not unlike the smaller of the two adzes from N38/30 (Leahy, this volume).

Two butt ends of roughouts were recovered from level 2. Both are quadrangular in section.

In addition to the adzes from known context in the squares, several other specimens are known to be from above the Rangitoto ash, although their exact level is uncertain. These include roughouts of triangular and quadrangular section, similar to examples from levels 2, 3, and 4. In addition, there is a bevel section of a highly polished adze of Duff's type 4. A more unusual specimen is a small adze (Fig. 5e), made on a flake, which has a triangular section with apex down, and on which the bevel appears to be formed from a water-worn pebble surface.

Although the specimens from the site are mostly fragmentary, they indicate that adzes of Duff's types 1, 2, 3, and 4 were present. The extent to which butt modification was present is not clear from the examples recovered. At least one fragment appears to be the butt end of a type 1A, however. The range of types is present up to level 3. The two examples from level 2 are both quadrangular, so it is not known whether the type 4 adze was still present at this stage.

In contrast to site N38/30 (Leahy, this volume), where abundant evidence of stone working was found, the roughouts from this site were not accompanied by convincing evidence of manufacture on the spot. No hammer stones were recovered from context except for a very small specimen which may be a hammer stone from level 1. No grindstones were found, and the numbers of stone flakes are very small. The explanation for the presence of so many roughouts is difficult. The roughouts themselves indicate that adzes were being made from local greywacke occurring in fairly handy-sized pieces. A number have traces of weathered cortex, or water-worn pebble surfaces.

FISHHOOK MANUFACTURE

More evidence for fishhook manufacture was present on the site. A number of drill points fashioned from greywacke were found, as well as one chert drill point. The latter was from level 4, while greywacke examples were found beneath the ash and in levels 2 to 4. Typical examples are illustrated in Fig. 6.

Two files suitable for working fishhooks were found in the site, both from above the ash, and one from a certain layer 3 context (Fig. 7a). A small number of chert flakes were found in level 2 and earlier contexts.

PEBBLE CHOPPER

A remarkable flake tool (Fig. 7b) was found on the surface of the site before excavation commenced. It is a large flake, struck from a pebble or water-worn boulder,

and has been further shaped by flaking to form a grip so that it closely resembles the Easter Island *mataa* (Heyerdahl and Ferdon 1961, pl. 75).

OBSIDIAN

A relatively small quantity of obsidian was found in the site. This was analysed for age and source by Green, and is included in a comparison of obsidian from a number of sites (Green 1964, pp. 135, 138 and 141). The single flake from beneath the ash gave a greater hydration rim measurement than any other obsidian from the Auckland province. The obsidian is no longer available for technological study.

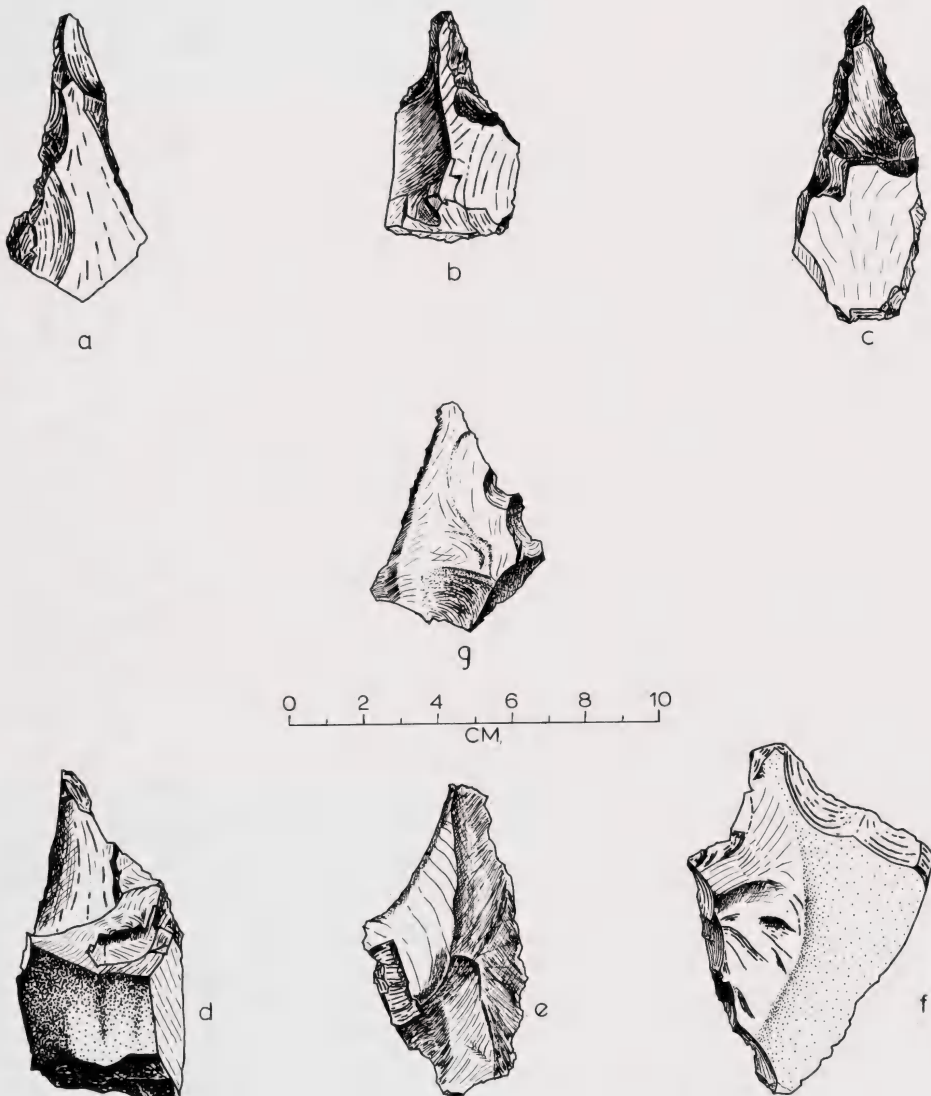


FIG. 6. Stone drill points from site N38/24.

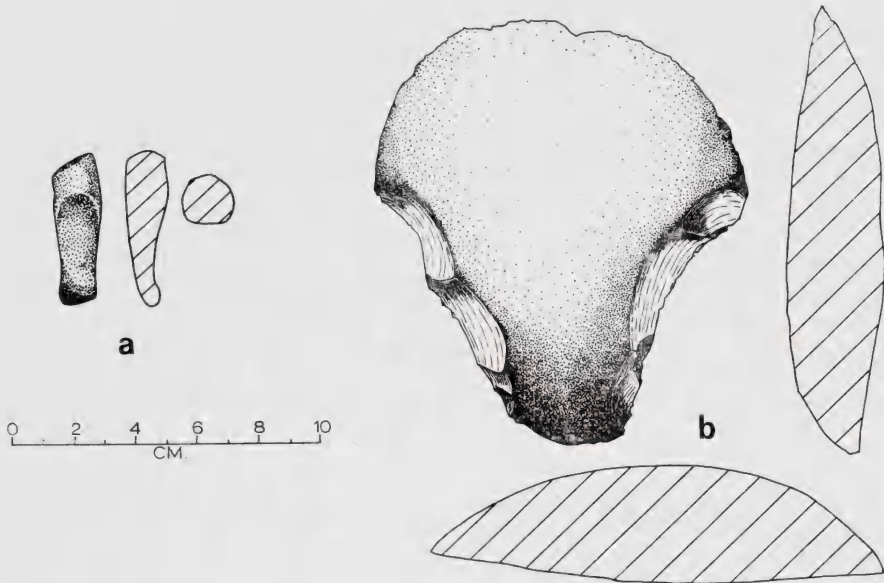


FIG. 7. Miscellaneous artifacts from site N38/24: a. file from layer 3, AU 1590/8.
b. flake tool from surface, AU 1604/1.

SUMMARY

The artifactual evidence indicates the use of the site from before the eruption of the Rangitoto ash through levels 4 and 3 by people with an Archaic material culture similar to that reported by Golson (1959) for the Pig Bay site. The principal features are one-piece fishhooks of bone, bone lure shanks, items associated with the manufacture of fishhooks including drill points and files, and adzes of rectangular and triangular cross-section shaped predominantly by flaking. The more restricted range of items from level 2 is less diagnostic, but the presence of flaked adze roughouts, and drill points, suggests a probable continuity of culture between this and earlier levels. The latest occupation of the site, however, lacks these artifacts, and may belong to a different phase of occupation.

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